Updated PCB work plan, abatement contractor plan and phasing plan
Bill Wessel
to:
Kimberly Tisa
04/05/2012 05:25 PM
Cc:
Glenn Nelson
Hide Details
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4 Attachments

Leominster HS3-21 PCB Work Plan 3 21 12 edited version 4-2-12bw rev.pdf

LHS Phasing Plan - PCB Areas Spring 2012.pdf PCBs Work Plan Leominster High Schoolrev8 - markup version.pdf

PCBs Work Plan Leominster High Schoolrev8.pdf

Kim

I've attached the updated PCB work plan in two formats – one with the mark-ups from the last version in blue ink for ease of your review and one in final format.

Also, attached is RM Technologies revised work plan that details landfill locations for each type of waste and the first phase plan for PCB work.

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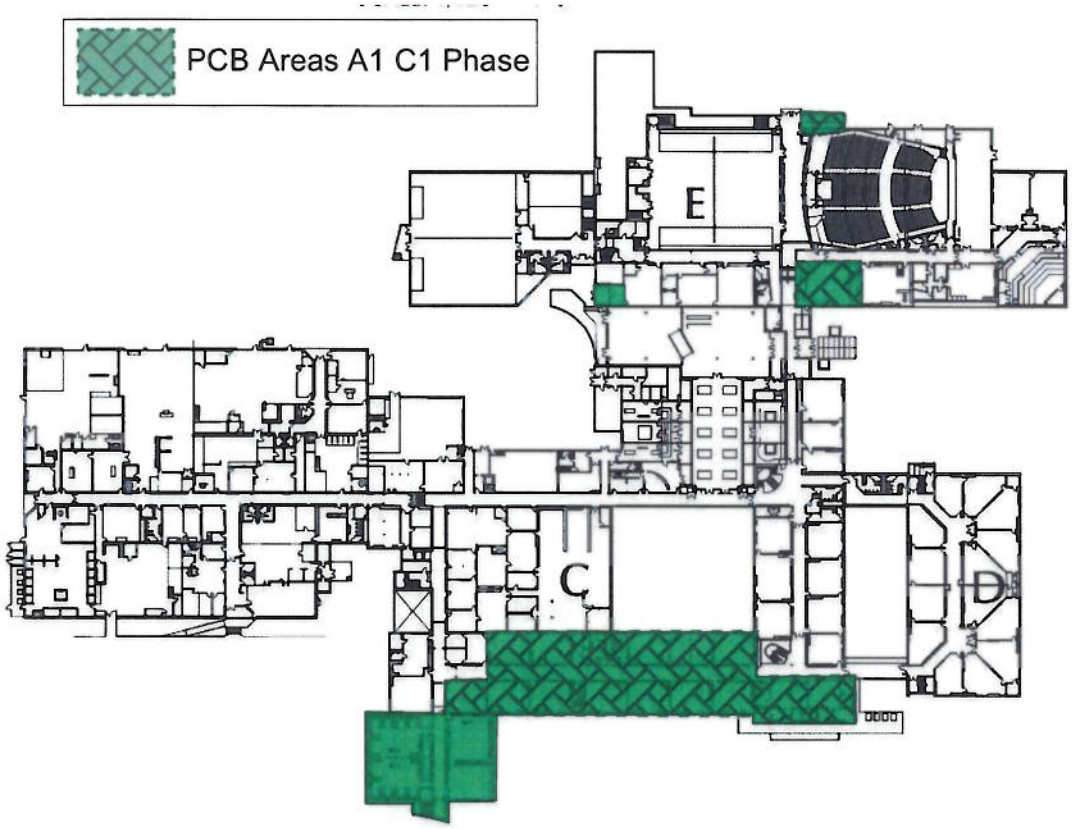
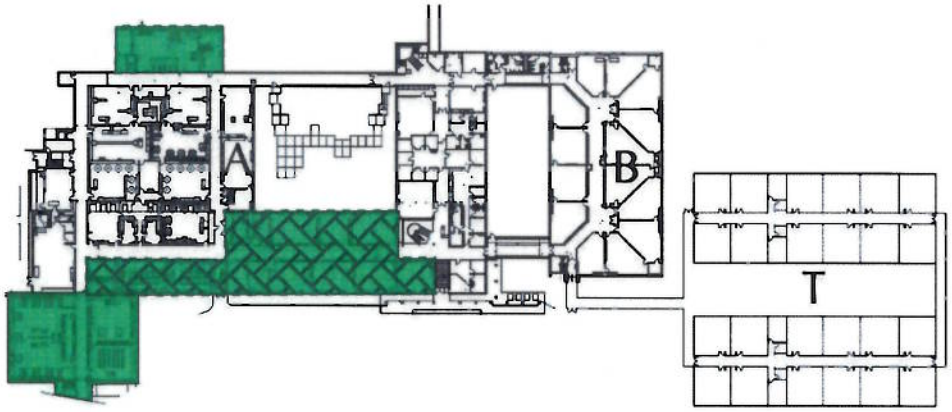
Leominster High School Phasing
2012 Spring (Feb. 18, 2012 to June 15, 2012)



Upper Level

SCALE: 1/128" = 1'-0"



Lower Level

SCALE: 1/128" = 1'-0"

SMITH & WESSEL ASSOCIATES, INC.
HAZARDOUS BUILDING MATERIALS AND AIR QUALITY SPECIALISTS

Work Plan for Removal of Polychlorinated Biphenyls in Caulking
Leominster High School
Leominster, Massachusetts

Prepared for:
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Project 11015

April 3, 2012

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INTRODUCTION

On behalf of The City of Leominster, James Jolicoeur, Superintendent of Schools, is responsible for the work outlined in this work plan. The work will be conducted in conjunction with a school renovation project that began in June, 2011, and is occurring throughout Leominster High School, located at 122 Granite Street in Leominster, Massachusetts. In preparation for this project Smith & Wessel Associates, Inc. (SWA) has inspected and sampled caulking materials to determine if polychlorinated biphenyls (PCBs) were present within the matrix of any of these materials. SWA collected samples of various caulking and glazing compounds throughout the school. Sample results indicate that PCB levels exceed the allowable concentration limits specified by the United States Environmental Protection Agency (EPA) Toxic Substances Control Act (TSCA) regulations in several types of caulking in multiple locations throughout the original (1961) building.

The school includes four construction periods. The original building construction consists of the A-Wing (lower level), C-Wing (upper level) and E-Wing (upper level), and portions of the F-Wing (also referred to as the CTE building). The entire B-Wing (lower level) and D-Wing (upper level) were constructed in 1976 as well as additions to the A-Wing (Science Room), C-Wing (Media Center and surrounding areas), E-Wing (Music), and F-Wing (New Gym). In 1990, the CTE building was constructed, with part of it integrated into the original building. Two temporary classrooms, A98-A99, were added on the lower level in 2001 and demolished as part of the renovation process. Refer to Appendix D for a diagram outlining the different construction phases.

A review of as-built drawings indicates that Thiokol caulking was specified at various points in the original construction, particularly at the interface between structural steel and block walls. According to a variety of sources, including a case study published by Heidelore Fiedler, Thiokol caulking contained between 1-40% PCBs.

The City of Leominster plans to remove the identified PCBs as part of the renovation/addition project, which is phased to occur from 2011 to 2013. SWA has created this work plan to address the presence of and removal of the PCBs. This work plan is presented to support an application for a Title 40 Code of Federal Regulations (CFR) disposal plan as outlined in 40 CFR 761.62(a) and 761.61(a) for disposal of PCB-contaminated caulking materials and associated porous materials.

Work activities shall include removal of the identified regulated PCBs caulking materials associated with doors, vents, facades, structural steel and expansion joints and disposal of these materials as PCBs waste and/or a mixed PCBs bulk product waste and asbestos-containing material (ACM). Adjacent porous materials, such as fiber board, that contain non-authorized PCBs will be disposed of as PCB bulk product waste as well.

Following remediation, a mandatory visual inspection and confirmatory surface sampling

will be conducted by a qualified environmental professional independent of the remediation contractor. Post-remediation surface sampling results shall be 1 micrograms per 100 square centimeters (1 µg/100 cm^2) or less for unrestricted use and disposal per 40 CFR 761.79. Because some of the masonry onto which caulking was applied may have become contaminated by PCBs through a leaching process, we anticipate that the above standard may not be achievable on some substrates through normal removal and cleaning methods. Because destructive removal of masonry at the school is not practical, this plan provides for a method to encapsulate these affected substrates, thereby providing a barrier between the PCBs and the environment.

Remediation of non-authorized PCBs and work related to it is expected to be completed in a phased approach as part of the renovation project over two years.

1.0 SAMPLING AND ASSESSMENT

1.1 Sampling of Caulk and Window Glazing Compound

On November 17 and December 1, 2010, and on May 25, 2011, SWA representatives collected samples of various caulking and glazing compounds throughout Leominster High School. Interior and exterior samples were collected from all wings of the school. The purpose of the sampling was to determine PCBs concentrations in these materials.

SWA collected 31 samples including window glazing compound, window caulking, caulking at beams/columns, door caulking, and vent caulking. Materials that were identified appeared to be original to the building. Multiple layers were not observed in any of the sampling locations.

SWA collected a minimum of 2 grams per suspect materials sample which were then placed into labeled individual sealed containers for transport to the laboratory.

EMSL Analytical, Inc. (EMSL) of Westmont, New Jersey, a fully accredited analytical laboratory, analyzed the bulk samples for the first two samples batches while Contest Analytical Laboratory of East Longmeadow, Massachusetts, analyzed the third sample batch. Both laboratories utilize EPA's SW-846 Method 3540C/8082 SOXHLET Extraction. (See attached results).

Results ranged from <1 ppm to 120,000 ppm. Materials that exceeded the EPA limit of 50 ppm for PCBs included interior and exterior door caulking, façade caulking, expansion joint caulking, vent caulking, and caulking at the interface of structural steel and masonry construction. Additionally, PCBs concentrations of 1 ppm but less than 50 ppm were measured in window caulking. Where PCBs are present between 1-50 ppm, they may be regulated if the PCBs content is related to contamination from another PCBs material that had be present in a concentration exceeding 50 ppm.

Tables 1 summarizes the results of all PCBs sampling of caulks and window glazing compound conducted at Leominster High School. Laboratory results are included as Appendix A.

Table 1 • Results of PCBs Analysis - Caulk

Type of Material	Location	PCB* Content (ppm)	Sample Number
Original 1961 Building			
Window glazing compound	On exterior windows throughout building	< 1	01A
Black window caulking	On interior side of windows –patch areas in A-Wing where window repair occurred	7.4	02A

Table 1 • Results of PCBs Analysis - Caulk			
Type of Material	**Location**	**PCB* Content (ppm)**	**Sample Number**
Beige door caulking	Throughout exterior	**56,000**	06A
Gray vent caulking	Exterior vents of building	**82,000**	08A
Window caulking	Exterior windows	***4.8-28.1***	09A, 10A
Caulking at façade	At stone façade on exterior of gym and auditorium	**41,200-50,400**	11A, 12A
Caulking at structural steel	Throughout interior interface with steel beams and columns and block	**41,900-76,000**	13A, 19A
Expansion joint caulking	Throughout building	**9.8-120,000**	05B, 14A, 15A See **Note 1** below
Gray interior window caulking	Scattered throughout building	< 1	16A C-03A
Interior door caulking	Throughout building	**4.5-69,000**	17A, 18A
B/D Wings and 1976 section of A/C Wings			
Tan expansion joint caulking	Throughout wings	< 1	05C, 21A, C-02A See **Note 1** below
Beige door caulking	Throughout wings	< 1	06B, 22A, C-01A, C05A See **Note 1** below
Gray window caulking	On exterior windows throughout wings	< 1	07A
Column caulking	Throughout wings	<1	20A, C04A See **Note 1** below
1990 CTE Building			
Black window caulking	On interior windows in admin. area	<1	02B 020312-01 020312-02 See **Note 2** below

Table 1 • Results of PCBs Analysis - Caulk			
Type of Material	**Location**	**PCB* Content (ppm)**	**Sample Number**
Black door caulking	On exterior doors throughout building	< 1	03A
Tan expansion joint caulking	Throughout building	< 1	05A

* Aroclor 1254 was the prominent PCBs congener detected in the analysis, while Aroclor 1260 was also detected in samples 10A, 11A, 12A, and 19A.

Note 1: For the expansion joint caulking in the original 1961 building and the tan expansion joint caulking, beige door caulking, and column caulking in the B/D wing, initial analysis by EMSL could not establish a PCB detection limit below one part per million. Using a special "clean-up" procedure, Contest Analytical re-analyzed samples from the exact same locations and determined a PCB detection limit of less than one part per million.

Note 2: Initial analysis of the black caulking indicated a PCB concentration of 1.2 ppm. Given that the material was installed in 1990 during the construction of the building, it was assumed that the detected PCB concentration may have been based on a sampling or laboratory error. Analysis of two additional samples indicated PCB concentrations of less than one ppm.

1.2 Sampling of Air

Air sampling for PCBs was conducted during school vacation week on February 24, 2011, and on May 25, 2011. SWA conducted the sampling according to the EPA protocol established in Method TO-10A. This method utilizes low volume Polyurethane Foam (PUF) sampling followed by Gas Chromatographic/Multi-Detector Detection (GC/MD). The low volume sample pumps were calibrated 3.0 liter of air per minute (lpm) on the May 25 sampling date and at 4.0 lpm on the February 24 sampling date and placed at four to five feet from the ground for an approximately 6-7 hour sampling period. SWA applied distinct sample numbers to each sample and recorded the number, location, sampling times and flow rates on a field form. On completion of the sampling, the samples were appropriately packaged and delivered using appropriate chain-of-custody to qualified analytical laboratories for analysis. EMSL Analytical conducted the analysis of the samples collected on February 24, 2011, while Contest Analytical conducted the analysis of the samples collected on May 25, 2011.

On the date of the initial sampling, Absolute Environmental, Inc. (Absolute) of Salem, New Hampshire, assisted SWA with removing small amounts of caulking within contained work areas. They utilized polyethylene sheeting sealed with duct tape to enclose the area of work, and made an opening into the area that was covered with a polyethylene flap. Negative pressure was established in the work area relative to

adjacent spaces to draw air into the work area utilizing air filtration devices equipped with High Efficiency Particulate Air (HEPA) filters. The AFDs were vented to the outside.

Air sample locations were selected to assure a cross-section of different areas were sampled on both levels of the school. They included an exterior control sample as well as other locations distributed throughout the school. The sample collected in E-Wing was within the work area that Absolute established and where approximately 10 linear feet of caulk was removed as well as small portions of brick and concrete block. This was performed to determine if elevated PCBs would be observed in close proximity of areas where PCBs caulk was removed and disturbed.

Results of air sample analysis are summarized in Tables 2A and 2B below. Laboratory data sheets are included in Appendix B.

Table 2A • Results of PCBs Analysis – Air Samples
February 24, 2011

Sample No.	Date	Sampling Period	Volume (liters)	Description/Location	PCBs Result (ng/m^3)
1.	02/24/11	7:02 am to 12:55 pm	1,412	Exterior control sample, outside main kitchen at rear of school	<71
2.	02/24/11	7:24 am to 2:51 pm	1,788	F-Wing, Room 411	<56
3.	02/24/11	7:29 am to 2:45 pm	1,744	A-Wing, Conference room in main administration, lower level	<57
4.	02/24/11	8:08 am to 2:58 pm	1,640	B-Wing, Room 162, lower level	<61
5.	02/24/11	8:31 am to 3:11 pm	1,600	Main cafeteria, upper level	<63
6.	02/24/11	8:50 am to 3:02 pm	1,488	E-Wing, Hallway outside room E-302, upper level, inside work area where caulk removal and brick/block sampling conducted	570*

* Aroclor 1254 was the PCBs congener detected in the sample.

Table 2B • Results of PCBs Analysis – Air Samples May 25, 2011					
Sample No.	**Date**	**Sampling Period**	**Volume (liters)**	**Description/Location**	**PCBs Result (ng/m^3)**
1.	05/25/11	2:50 pm to 7:58 pm	924	A-Wing, Conference room in main administration, lower level	47
2.	05/25/11	2:59 pm to 8:05 pm	918	B-Wing, Room 162, lower level	ND
3.	05/25/11	3:08 pm to 8:14 pm	918	F-Wing, Room 411	35
4.	05/25/11	3:24 pm to 8:25 pm	903	E-Wing, Hallway outside room E-302	150
5.	05/25/11	3:29 pm to 8:31 pm	906	Exterior control sample, outside main kitchen at rear of school	ND

EPA has calculated a "reference dose" of 20 nanograms PCB per kilogram of body weight per day that they've calculated will not cause harm. In turn, they established air concentrations for school environments that should keep exposures below the reference dose. Assuming a background of no significant PCB contamination in building materials, an airborne concentration of 600 ng/m^3 for high school students, aged 15 years to less than 19 years old, should assure exposure is not above the reference dose. For adults 19 years and older, a concentration below 450 ng/m^3 is considered acceptable.

In five of the six air samples collected on February 24, 2011, no PCBs were detected above the level of detection of the sampling method, 56-71 nanograms per cubic meter of air (ng/m^3). Only in sample 6, collected within the work area where caulk was removed, was a detectable concentration observed. In this area, the detected PCBs concentration was 570 ng/m^3. Although the measured concentrations of PCBs were above than the EPA acceptable levels for adults (but slightly lower than the concentration acceptable for high school students) in this location, it is likely caused by the disturbance of PCBs caulk immediately adjacent to the sample.

On May 25, 2011, analysis was conducted for PCBs homologs. Results indicate the concentration of one of the interior samples was below the detection limit of the sampling method while concentrations in the three remaining locations ranged from 35-150 ng/m^3. These results are well below EPA standards related to acceptable PCBs in air for all populations.

1.3 *Sampling of Substrates*

On June 6-9, and October 5, 2011, we collected samples of concrete and brick substrates that abut PCBs-containing caulk joints. We collected the samples using protocol established by the Region 1, EPA-New England Draft Standard Operating Procedure for Sampling Concrete in the Field. We collected one-half inch from joints containing caulk and at varying distances from the joints to determine if PCBs leaching had occurred into the adjacent substrates.

Samples were collected into both brick and concrete block using a carbide drill bit attached to a rotary impact hammer drill to obtain a minimum of two gram sample for analysis. The resulting powdered brick and concrete block debris were collected into individual glass leak-tight sample containers. The samples were labeled and the sample number and description were recorded onto a field data sheet and delivered using appropriate chain-of-custody to either Contest Analytical Laboratory or Netlab of North Providence, Rhode Island, for analysis. The laboratories analyzed the samples for PCBs content using Method 3540C/8082 as detailed in Tables 3A and 3B below.

Table 3A • Results of PCBs Analysis – Concrete block

Sample Number	Location	PCBs* Content (ppm)
CB060611-01A	Hallway at F-411, ½" from caulk joint	71
CB060611-01B	Hallway at F-411, 8" from caulk joint	2.4
CB060611-01C	Hallway at F-411, 16" from caulk joint on adjacent block	0.94
CB060611-02A	Lower hallway near boiler room, ½" from caulk joint	170
CB060611-02B	Lower hallway near boiler room, 8" from caulk joint	15
CB060611-02C	Lower hallway near boiler room, 16" from caulk joint on adjacent block	13
CB100511-01	Lower hallway near Boiler Room, 36" from caulk joint on adjacent block	<1
CB060611-03A	Hallway at E-311, 1/2" from caulk joint	3.8
CB060611-03B	Hallway at E-311, 8" from caulk joint	2.5
CB060611-03C	Hallway at E-311, 16" from caulk joint on adjacent block	2.6
CB100511-02	Hallway at E-311, 36" from caulk joint on adjacent block	1.05
CB060611-04A	In Room C-234, ½" from caulk joint	910
CB060611-04B	In Room C-234, 8" from caulk joint	13
CB060611-04C	In Room C-234, 16" from caulk joint on adjacent block	25

Table 3A • Results of PCBs Analysis – Concrete block		
Sample Number	**Location**	**PCBs* Content (ppm)**
CB100511-03	In Room C-234, 36" from caulk joint on adjacent block	<1

Table 3B • Results of PCBs Analysis – Brick		
Sample Number	**Location**	**PCBs* Content (ppm)**
B060911-01A	Exterior in senior courtyard, ½" from caulk joint	90
B060911-01B	Exterior in senior courtyard, 4" from caulk joint	<1
B060911-02A	Exterior behind auditorium, ½" from caulk joint	1.5
B060911-02B	Exterior behind auditorium, 4" from caulk joint	<1
B060911-03A	Interior hallway by room C-213, ½" from caulk joint	42
B060911-03B	Interior hallway by room C-213, 4" from caulk joint	1.2
B100511-01	Interior hallway in upper E-wing hallway, 8" from caulk joint **(see Note 1 below)**	<1

Note 1: When re-sampling interior brick, access was blocked to room C-213 where previous sampling had occurred. A like location was selected in the E-wing hallway to duplicate this location.

* Aroclor 1254 was the PCBs congener detected in the samples.

Sampling results indicate that PCB concentrations in concrete block directly adjacent to caulk joints typically are substantially greater than those concentrations measured eight and 16 inches from the joint. This appears indicative of leaching of PCBs into the substrate, primarily directly adjacent to the joint. Sampling at 36 inches from caulk joints in the three locations where PCBs contents exceeded one ppm at 16 inches from joints indicate results below one ppm in two of three samples and at 1.05 ppm in a third location. These results indicate leaching of PCBs into concrete block is negligible at 36 inches from joints.

For brick samples, PCBs concentrations immediately adjacent to the caulk joints ranged from 1.5 to 90 ppm, while four inches from caulk joints, two of the three samples indicated PCBs concentrations below one ppm with a third sample of interior brick resulting in 1.2 ppm. Sampling of a similar location of interior brick 8 inches from a caulk joint indicated a PCBs concentration below one ppm. This demonstrates minimal leaching of PCBs into brick, primarily within the first one-half inch from joints.

1.4 Sampling of Soil

On June 4, 2011, we collected samples of soil at the dripline (18" from the edge) for the 1961 building. Sampling was collected of the top three inches of soil at each location. On September 28 and October 5, 2011, additional sampling was conducted of soil at the dripline from three to six inch depth and at three feet from the building edge of the top three inches of soil. Soil was placed into individual glass sample jars that were labeled with sample numbers and descriptions marked on corresponding chain-of-custody forms. Samples were delivered to either Contest Analytical or Netlab for analysis for PCBs content using Method 3540C/8082 as detailed in Table 4 below.

Table 4 • Results of PCBs Analysis – Soil

Sample Number	Location	PCBs* Content (ppm)
S060411-01	1.5 feet from building behind auditorium at façade joint - 0-3" depth	2.5
S092811-01	1.5 feet from building behind auditorium at façade joint – 3-6" depth	1.13
S100511-01	3 feet from building behind auditorium at façade joint – 3-6" depth	<1
S060411-02	1.5 feet from building behind work-out room at expansion joint- 0-3" depth	0.94
S092811-02	1.5 feet from building behind work-out room at expansion joint- 3-6" depth	<1
S060411-03	1.5 feet from building at metal shop below window caulk - 0-3" depth	0.24
S092811-03	1.5 feet from building at metal shop below window caulk- 3-6" depth	<1
S060411-04	1.5 feet from building in senior courtyard at vent- 0-3" depth	0.70
S092811-04	1.5 feet from building in senior courtyard at vent- 3-6" depth	<1
S060411-05	1.5 feet from building outside room A-111 at expansion joint- 0-3" depth	1.9
S100511-02	3 feet from building outside room A-111 at expansion joint- 0-3" depth	<1
S060411-06	1.5 feet from building outside of room A-127 at vent- 0-3" depth	2.9
S092811-05	1.5 feet from building outside of room A-127 at vent- 3-6" depth	<1
S100511-03	3 feet from building outside of room A-127 at vent- 0-3" depth	<1
S060411-07	1.5 feet from building outside of room E-242 at expansion joint- 0-3" depth	1.5

Table 4 • Results of PCBs Analysis – Soil		
Sample Number	**Location**	**PCBs* Content (ppm)**
S092811-06	1.5 feet from building outside of room E-242 at expansion joint- 3-6" depth	1.56
S100511-04	3 feet from building outside of room E-242 at expansion joint- 0-3" depth	<1

Concentrations of PCBs in four of the seven samples collected at the dripline, approximately 1.5 feet from the building slightly exceeded the EPA limit of one ppm for PCBs in soils, while the PCBs content of three of the samples was less than one ppm. The average PCBs concentration of the seven samples was 1.5 ppm.

Follow-up sampling was conducted to determine if PCBs concentrations exceed one ppm below the top three inches of soil and beyond the building's dripline. Sampling of soil at the dripline was conducted in the soil from three to six inches in depth. Four of these six samples had PCBs concentrations below one ppm two samples slightly exceeded one ppm, at 1.13 ppm and 1.56 ppm, respectively. The average of these samples is 0.71 ppm, below one ppm. Four samples were also collected of the top three inches of soil three feet from the edge of the building. The PCBs concentrations of all samples were less than one ppm.

Based on these results, PCBs in soils above the one ppm threshold are limited to the top six inches of soil within three feet of the building edge.

1.5 Wipe Sampling

In Table 5 below, SWA has listed results of sterile wipe testing on PCB-contaminated masonry materials, including the locations where the materials were tested, the analytical result, and the corresponding bulk sample reference numbers. Before the sampling was conducted, Atlantic Coastal Construction had removed a small amount of caulking, cleaned the substrate using appropriate tools, and then applied a variety of encapsulants as part of "pilot testing". Sample locations listed in bold font indicated PCBs in concentration greater than 1 µg/100 cm^2.

Table 5 • Results of PCBs Analysis – Wipe samples		
Sample Number	**Material/Location**	**PCBs* Content (µg/100 cm^2)**
October 13, 2011	***Concrete Block/ In Auditorium Store Room***	
W101311-01A	Polyguard, at caulk joint	**3.67**
W101311-01B	Polyguard 6", from caulk joint	0.65
W101311-02A	Sika 62 Tan, at caulk joint	**5.28**

Table 5 • Results of PCBs Analysis – Wipe samples		
Sample Number	**Material/Location**	**PCBs* Content ($\mu g/100\ cm^2$)**
W101311-02B	Sika 62 Tan, 6" from caulk joint	0.70
W101311-03A	Sika 62 Gray, at caulk joint	**2.95**
W101311-03B	Sika 62 Gray, 6" from caulk joint	0.71
W101311-04A	Rustoleum, at caulk joint	**2.10**
W101311-04B	Rustoleum, 6" from caulk joint	0.67
W101311-05A	Tremco, at caulk joint	**5.37**
W101311-05B	Tremco, 6" from caulk joint	**1.50**
October 17, 2011	***Brick/Exterior of Auditorium***	
W101711-01A	Tremco, at caulk joint	**2.93**
W101711-01B	Tremco, 6" from caulk joint	<1
W101711-02A	Rustoleum, at caulk joint	**3.16**
W101711-02B	Rustoleum, 6" from caulk joint	<1

Sampling was conducted within the actual caulk seam as well as on wall surfaces approximately six inches from the seam. Sterile gauze pads were wiped over a measured 100 square centimeter of sampling surface and placed into individually sealed containers. The sample containers were appropriately labeled, chain-of-custody forms completed for delivery to Netlab.

Results were compared to the EPA standard for schools in wipe samples of 1 $\mu g/100\ cm^2$. In each case, sampling within the caulk seams indicted results that exceeded this standard. For sampling of wall surfaces six inches from seams, results were less than this concentration with the exception of the Tremco product, which indicated a result of 1.5 $\mu g/100\ cm^2$.

2.0 REGULATIONS, PERMITS & QUALIFICATIONS

The remediation contractor shall be responsible for obtaining all necessary permits for removal and disposal of all PCBs-contaminated materials at Leominster High School. The cost for the necessary permits shall be included in the contractor's submittal to the City of Leominster. It shall be the contractor's responsibility to adhere to all applicable federal, state and local rules and regulations, which may include those of the EPA, the Massachusetts Department of Environmental Protection (MA DEP), the U.S. Occupational Safety and Health Administration (OSHA) and the Leominster Fire Department.

The contractor shall conform to all stipulations and permits identified in the contract bid documents, including any conditions set forth in the EPA approval. Where a conflict arises between regulations, the contractor shall adhere to the most stringent regulation.

2.1 Work Procedures

The contractor shall prepare written work and health and safety plans. The work plan shall be prepared and submitted both to the EPA as well as to the Leominster Public Schools. Consideration should be given to the protection of workers, other contractors, school and city employees and visitors, from PCBs in any and all forms. Work procedure plans shall address the following at a minimum:

- Air monitoring to be conducted by the contractor with the establishment of appropriate action levels. Where action levels are exceeded, the plan shall include provisions for work stoppage and adjusted work practices and engineering controls to assure action levels do not continue to be exceeded;
- Engineering controls and work practices that will ensure that PCBs will not be released from the work area and will protect workers health and safety within the work area;
- Workers' protective clothing and equipment, and workers' safe work practices in work areas; such as the exclusion of eating, drinking, and smoking, while in work areas;
- Proper construction, placement and use of decontamination facilities for workers and others who enter work areas;
- The posting of appropriate warning signs at all entrances to each work area;
- Removal and waste disposal methods;
- End of work shift cleaning and storage practices, and plans to securely cover any window or door openings at the end of the day;
- Contingency plans addressing possible contamination inside or outside the work areas;

- Identification of waste disposal site(s); and
- Supervision of work at all times by a competent person.

2.2 Training & Certification

Personnel involved in remediation activities shall have all required training, medical certifications and respirator fit testing as specified by OSHA. A competent person representing the contractor must be on site at all times during remediation work. Contractor must have completed a Hazards Communication Program in conformance with 29 CFR 1926.59.

2.3 Contractor Qualifications

The contractor must meet the following minimum requirements:

- Documented experience in the remediation and proper disposal of PCBs-contaminated materials
- Have the resources (staff, materials, equipment, etc.) to complete the scope of work
- Have a written health and safety program that addresses the cleanup of hazardous materials
- An understanding of federal TSCA regulations

2.4 Fire Safety & Emergency Action Plans

The contractor shall have on site, fire safety and emergency action plans. These plans shall include the following at a minimum:

- Emergency escape procedures and routes
- The duties of all personnel during emergencies
- A listing of all workplace hazards associated with remediation work
- Contact names and numbers

3.0 SCOPE OF WORK

3.1 Scope of Work

This scope of work addresses the removal and proper disposal of PCB-contaminated caulking materials in the original (1961) building of Leominster High School. All caulking with PCB concentrations of greater than 50 ppm and porous fiber board abutting caulk shall be removed for proper disposal by a qualified remediation contractor. Window caulking containing between 1-50 ppm will also be removed and disposed as by a qualified remediation contractor. Additionally, any non-porous surfaces that may have become contaminated by the abutting PCBs caulk shall be appropriately cleaned to the acceptance criteria of 1 $\mu g/100\ cm^2$.

An encapsulant shall be applied to porous brick (except at windows) and concrete block abutting caulk joints to assure a barrier is created between the substrate and building occupants. The encapsulant shall be applied within the caulk seam after all caulk and fiber board has been removed, surfaces appropriately cleaned of all caulk residue, and Capsur has been applied to further remediate any residual caulk. For concrete block, all surfaces within 36 inches of caulk seams shall be encapsulated. For brick, all surfaces within 8 inches of caulk seams shall be encapsulated. All remediation activities shall comply with EPA TSCA requirements to protect the environment and public health. All materials shall be disposed of in a manner to meet all federal and state regulatory requirements.

Table 6 presents a summary of the materials to be abated and their locations. Quantities are shown in linear feet (lf).

Table 6 • Locations of PCB-Containing Caulking and Surfaces for Encapsulation

Location	Material	Estimated Caulk Seam Quantity	Estimated Quantity of Surface for Encapsulation
A & C Wings			
Classrooms, corridors, offices, bathrooms, storage areas, transformer room, and boiler room	Caulking at structural columns, doors, and expansion joints abutting concrete block	4,500 lf	14,700 sf
Corridors and bathrooms	Caulking at structural columns, doors, and expansion joints abutting glazed tile	300 lf	Seal seam only

Table 6 • Locations of PCB-Containing Caulking and Surfaces for Encapsulation			
Location	**Material**	**Estimated Caulk Seam Quantity**	**Estimated Quantity of Surface for Encapsulation**
Corridors	Caulking at structural columns, doors, and expansion joints abutting brick	20 lf	15 sf
E Wing			
Auditorium	Wall caulking at projector room abutting brick	3 lf	2 sf
Auditorium	Door caulking abutting brick	16 lf	11 sf
Classrooms, corridors, storage rooms, cafeteria, kitchen, teacher's lounge, gym and locker rooms	Caulking at structural columns, doors, and expansion joints abutting concrete block	1325 lf	4,000 sf
Corridors, kitchen, bathrooms and locker rooms	Caulking at structural columns, doors, and expansion joints abutting glazed tile	120 lf	Seal seam only
Gym hall, cafeteria, and corridors	Caulking at structural columns, doors, and expansion joints abutting brick	60 lf	50 sf
Corridors from C to E Wing	Caulking at structural columns and expansion joints abutting concrete block	150 lf	450 sf
Corridors from C to E Wing	Caulking at structural columns and expansion joints abutting glazed tile	150 lf	Seal seam only
F Wing			
Classrooms, corridors, storage rooms, restrooms	Caulking at structural columns and expansion joints abutting concrete block	550 lf	2,475 sf
Corridors and restrooms	Caulking at structural columns, doors and expansion joints abutting glazed tile	200 lf	Seal seam only

Table 6 • Locations of PCB-Containing Caulking and Surfaces for Encapsulation			
Location	**Material**	**Estimated Caulk Seam Quantity**	**Estimated Quantity of Surface for Encapsulation**
Exterior			
Windows	Window frame caulk abutting brick	1,850 lf	NA
Exterior gymnasium and auditorium	Wall caulking at decorative façade abutting brick	850 lf	570 sf (brick) 425 sf (concrete/stone)
Exterior	Door caulking abutting brick	220 lf	150 sf
Exterior	Vent caulking abutting brick	100 lf	70 sf

The estimated total surface area of concrete block slated for encapsulation is 21,625 square feet. The estimated total surface area of brick slated for encapsulation is 829 square feet. The estimated total surface area of concrete/stone decorative façade for encapsulation is 425 square feet. The estimated amount of all caulk is 10,414 linear feet. All seams will require the application of encapsulant. Two coats of encapsulation shall be applied on all surfaces, while three coats of encapsulant shall be applied within caulk seams.

3.2 Work Sequencing

The work sequence should consist of the following:

- Preparation and containment of work areas
- Caulking removal
- Caulking disposal
- Decontamination of masonry, glazed tile, and metal surfaces
- Visual inspection
- Confirmatory surface sampling

The contractor shall be responsible for supplying all necessary labor, materials, and equipment in order to complete this scope of work. The work will not be considered complete until final visual inspection and testing results have been obtained and documentation of waste disposal has been submitted to the City of Leominster.

3.3 Schedule

Remediation activities shall be performed according to the schedule set forth by the City of Leominster. Scheduling should take into account the activities of other contractors that will be on site. Remediation is expected to be conducted during daytime hours beginning in Fall, 2011 and completed by Summer, 2013, according to the project phasing schedule. All work conducted under this plan shall be performed during school vacations or in portions of the building which are under active construction and not occupied by students or any school personnel.

Phasing details include:

1. Phase 2: 2011 Fall Semester – No PCB work
2. Phase 3: 2012 Spring Semester – A and C Wing Classrooms, except Science Rooms
3. Phase 4: 2012 Summer Semester – Locker Room and Gymnasium, Art Rooms and additional portions of A and C Wings and corridors
4. Phase 5: 2012 Fall Semester – No PCB work
5. Phase 6: 2013 Spring Semester – Administration, "C" Rooms and Science Labs
6. Phase 7: 2013 Summer Semester – Cafeteria and Kitchen

4.0 SITE PREPARATION

4.1 Work Area Isolation

Warning tape and signs clearly demarcating exclusion zones must be displayed at all times by the contractor. Exclusion zones shall be off limits to unauthorized personnel at all times.

For interior and exterior work for all locations where caulk contains PCBs greater than 50 ppm, Contractor shall establish full containment enclosure using 6-mil polyethylene sheeting sealed with duct tape. For interior work at caulk seams, containment shall include mini-enclosures at caulk seams to minimize floor area to be cleaned. Secondary primary enclosure shall be established using 6-mil polyethylene sheeting barriers to enclose work zones with access to the work zone via a decontamination facility. Establish sufficient negative pressure (0.2 inches water column) using air filtration devices equipped with HEPA filtration. Only access work areas through one-stage decontamination facility.

4.2 Waste Containers

The contractor shall be responsible to obtain and place on site, the appropriate PCBs waste containers. Placement of waste containers shall be coordinated with the general contractor. The waste containers shall be clearly marked according to 40 CFR Part 761.40 as accepting PCBs waste only and shall be kept secure so that no other waste is accidentally co-mingled with PCBs waste.

5.0 REMOVAL PROCEDURES

In any instance where the caulking is also an ACM, removal and disposal shall be performed according to all applicable regulations for mixed waste. Vent and door caulking at the site are ACM.

5.1 Caulking Removal

Caulking shall be removed using the following procedures:

- Without causing damage to building finishes and construction materials, use hand or power tools to scrape, chisel, or otherwise remove caulking from all locations outlined in section 3.1 of this work plan to the point where no visible caulking remains. Fiber board is present at joints for steel columns and expansion joints. The fiber board and other porous filler material at caulking locations shall also be completely removed from each location. Residual caulking remaining on masonry and metal surfaces shall also be removed by scraping, wire brushing, or other appropriate methods to completely remove caulk from the substrate without damaging it. A low pressure hand sprayer shall be used to wet materials and keep dust levels to a minimum.
- Where caulk abuts slate window sills inside the building, remove sills and bring to a remote fully-contained work area. Completely remove caulk from sill and appropriate clean, per 5.2 below. Sills to be re-installed by general contractor after wipe sampling is conducted to confirm PCB levels are less than 1 µg/100 cm^2. In Phase 1, approximately 656 linear feet of sills are present which will require decontamination of approximately one square foot of area per 16 linear feet of sill. Thus, approximately 41 square feet of surfaces in Phase 1 will require decontamination with additional material in later phases.
- Per project demolition plans, where CMU walls are being demolished and they abut PCB caulk, saw-cut and remove wall three feet from caulk joint. Package and dispose of wall section within three feet of caulk joint as PCB remediation waste.
- Where demolition plans require exterior façade section to be removed at auditorium, package and dispose of concrete/stone section for disposal as PCB remediation waste.
- Use a HEPA filter vacuum to clean up dust and residue. Wet wiping methods may also be used.
- Place all waste in appropriately lined and labeled 55-gallon drums for transport to the waste disposal site.

5.2 Cleaning of Adjacent Surfaces

Any metal vents, door frames, columns, glazed tile, concrete block, brick, and like surfaces that have PCB-contaminated caulking on them or abutting them shall be decontaminated before re-use or disposal. Decontamination will be conducted in the following manner:

- Use hand and power tools equipped with wire brush or similar attachment, as necessary, to scrape, chisel, or grind caulking from non-porous surfaces. Assure removal method does not damage any substrate to remain.
- Clean surfaces with a water-based solvent such as Capsur by Integrated Industries, or approved equal. No visible caulking or related residue shall remain at the completion of the cleaning process.
- Used cloths that are used in the cleaning process and liquid wastes shall be collected and disposed of as TCA/RCRA waste.
- Engineering controls and personal protective equipment, including respiratory protection must be employed to prevent spread of contaminants from the work area and to protect workers.

5.3 Final Cleaning

All surfaces within the work area, including polyethylene sheeting, shall be thoroughly cleaned using a combination of wet wiping and HEPA vacuum until a level of no visible debris is achieved.

When cleaning is complete, a visual inspection and confirmatory wipe sampling will be conducted per Section 7 of this work plan.

5.4 Soils Removal

Testing of soils around the 1961 building indicated PCBs concentrations of less than one to 2.9 ppm in the top three inches of soil within 1.5 feet of the building. Initial sampling indicated PCBs concentrations below one ppm in soils at 3 feet from the building and in the six of seven samples collected 1.5 feet from the building from three to six inch depth.

Based on these results, in all non-paved locations abutting the 1961 building, Contractor shall remove the top six inches of soil from the edge of the building to a point three linear feet from the edge of the building and package and dispose of it as PCB remediation waste. Upon completion of soils removal, random soil sampling approximately every 20 linear feet shall be collected from six to nine inch depth. Additional soils removal will only be necessary if sample results indicate PCBs concentrations exceeding one ppm.

6.0 MATERIAL STORAGE, HANDLING AND DIPOSAL

6.1 Waste Materials Handling

All PCBs bulk product waste shall be removed intact, to the extent possible. PCB bulk product waste shall include all removed caulks, fiber board within caulk seams, metal louvers and any other component slated for removal abutting and contaminated by caulk. The contractor shall remove materials in such a way as to minimize breakage and to avoid them from becoming friable. Once removed, these materials shall be placed into 6-mil polyethylene disposal bags (for PCB waste only) or wrapped in two layers of 6-mil polyethylene and transported to a lined container on site by the end of the work shift. For temporary storage, PCB waste may also be placed into lined fiber drums for transport to lined container by the end of the work shift. Any temporary bags or drums shall be placed on poly sheeting to prevent spillage onto floors or ground. All containers holding PCB waste shall be clearly marked as such per 40 CFR 761.40.

The poly sheeting shall also be packaged as PCB remediation waste at the end of the work shift. Personal protective equipment used by workers shall be discarded as PCB remediation waste at the end of the work shift as well.

6.2 Disposal

Contractor shall dispose of all waste in accordance with all applicable federal and state regulations. Waste shall be transported to a facility licensed to receive and retain PCB bulk product waste or PCB remediation waste, as applicable, per 40 CFR 761.61 and 761.62. Contractor shall also provide documentation proving that the selected landfill is able to receive PCB waste according to these regulations. Contractor shall supply the City of Leominster with all waste manifests at the completion of the project. Copies of all manifests shall also be provided to the EPA as part of the final report.

All PCB waste shall be stored according to EPA TSCA regulations and shall be kept separate from all other waste produced by the contractor and any other waste produced by other contractors on site. Compliance with 40 CFR 761.40 and 761.65 for storage and marking of containers must be adhered to by the contractor.

7.0 POST-REMEDIATION CLEARANCE PROCEDURES

Prior to the completion of the project, post-remediation sampling will be conducted in order to verify compliance with performance criteria.

7.1 Visual Inspection

Decontaminated areas will be inspected by Owner's Environmental Consultant for any visible dust and debris and to appropriately determine that all PCBs material has been successfully removed. If any PCBs material or visible dust and debris remains on any surface, the contractor will be required to re-clean until satisfactory results are obtained.

7.2 Substrate Encapsulation

Test results of substrates have indicated that PCBs may have leached into substrates abutting PCBs caulking. Thus, complete removal of PCBs from the concrete block (and possibly other substrates) is not possible without actually removing portions of the block. Based on an estimated quantity of 21,625 square feet of contaminated brick (assuming approximately 8" from caulking joints), concrete/stone façade, and concrete block (assuming approximately 36" from caulking joints), the estimated cost to remove and replace these materials is estimated at $1.45-1.72 million. Because of the extraordinary costs to perform the removal and replacement of these materials, encapsulation of these materials is the proposed temporary remediation solution. Further, air testing in the building has indicated low background concentrations of PCBs in air, even with the caulking present.

At the completion of PCBs removal and cleaning, Contractor shall apply an encapsulant sufficient to provide a barrier over the brick and concrete block such that PCBs concentrations on the surface are equal of less than the clearance standard in 7.3 below. Once the encapsulant has cured, apply additional coatings, as necessary, to the surface to assure the clearance standard is achieved. The encapsulation shall include all surfaces within each caulk joint. Additionally, the surface of all adjacent concrete block within 36 inches of each caulk seam shall be coated with encapsulant. Because analysis of brick has indicated minimal leaching into this substrate, encapsulant of 8" of brick adjacent to caulk joints shall be conducted to assure a minimum of one brick length is encapsulated. A minimum of two coats of encapsulant is required on all surfaces with a minimum of three coats of encapsulant within caulk seams.

7.3 Wipe Sampling

The Owner's independent Environmental Consultant will perform representative wipe sampling of each type of masonry substrate from which caulk is removed and where encapsulation is conducted, including brick, concrete block, and concrete/stone façade. Non-porous surfaces abutting caulk to be removed include metal columns. Wipe sampling shall be conducted on these metal surfaces at the completion of decontamination procedures. One sample shall be collected for every 1,000 square feet

of substrate of encapsulated surfaces on concrete block, brick, and concrete/stone. Based on the square footage of encapsulated materials, this will require collection of approximately 25 samples. Decontaminated metal and glazed tile within three inches of caulk seams and slate window sills shall be sampled for every 10% of surface area. A minimum of three samples per substrate shall be collected in a randomly selected manner. Additionally, within caulk seams and on metal surfaces abutting seams, one wipe sample shall be collected for every 200 linear feet of substrate. Based on approximately 10,000 linear feet of caulk seam, this will require approximately 50 samples of brick and block at seams. Based on approximately 2,000 square feet of metal components and glazed tile surface area to be decontaminated, 200 samples on cleaned metal components and glazed tile abutting caulk seams will be necessary.

To verify appropriate clean-up techniques were employed for the work, a minimum of two wipe samples shall be conducted in each primary containment work zone outside of mini-enclosure barriers. Samples shall typically be collected on floors or other horizontal surface proximate to containment barriers. A diagram detailing sample locations will be provided to EPA during the course of the work for each phase.

Wipe samples will be submitted to a laboratory for analysis using EPA method 3540C/8082 and must achieve results of 1 $\mu g/100\ cm^2$ or less for nonporous surfaces that are cleaned of PCBs contamination and where porous surfaces are encapsulated.

7.4 Air Monitoring

At the completion of the work for each phase and before non-authorized personnel are permitted to enter interior work areas, the Owner's Environmental Consultant shall collect air samples to determine concentrations of PCB homologues. A minimum of one air sample per interior primary containment work zone shall be conducted. The acceptable concentration for samples shall be 450 nanograms of PCBs per cubic meter of air ($450\ ng/m^3$).

Recleaning within the work zone, including the use of wet wiping techniques and vacuuming of surfaces using HEPA-equipped vacuums and filtering of air utilizing HEPA-equipped air-filtration devices shall be required of the contractor in the event elevated air concentrations are observed.

8.0 PROJECT CLOSE-OUT

At the completion of the project the contractor shall be responsible to remove, from the site, all equipment and materials used in the project and all waste generated during the project. The contractor will also be responsible to repair any damage to the building or other site components caused by the remediation work.

The project will be considered completed when the criteria listed above are met, successful testing results have been obtained, and the City of Leominster has received the waste manifests from the contractor for all waste generated during the project.

A deed restriction will be placed on the project by the City of Leominster relative to any remaining residual PCBs. A long term monitoring and maintenance plan is being prepared to assure that PCBs substrates that are encapsulated are appropriately monitored and managed by the School Department.

9.0 HEALTH & SAFETY

A written Health and Safety plan must be submitted by the contractor. This plan shall be prepared by the contractor to describe engineering controls, work practices, and personal protective equipment to be used. Contractor shall provide proof of licensed hauler and proper documentation of facility that will accept the generated PCBs waste. The contractor shall also provide, and have on site at all times, copies of training and medical records of all workers who will be involved in the project.

APPENDIX A

Certificates of PCB Sample Analysis - Caulk

APPENDIX B

Certificates of PCB Sample Analysis – Air Samples

APPENDIX C

Certificates of PCB Sample Analysis – Masonry Substrates

APPENDIX D

Certificates of PCB Sample Analysis – Soil

APPENDIX E

Certificates of PCBs Analysis – Wipe Sampling

APPENDIX F

Building Diagrams of Sample Locations